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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/539,102	06/15/2005	Martijn Henri Richard Lankhorst	NL03 1069 US	7149

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EXAMINER	
VALENTINE, JAMI M	
ART UNIT	PAPER NUMBER
2815	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/17/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/539,102	LANKHORST ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jami M. Valentine, Ph.D.	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

1)  Responsive to communication(s) filed on 15 June 2005.

2a)  This action is **FINAL**.                    2b)  This action is non-final.

3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## **Disposition of Claims**

4)  Claim(s) 1-12 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5)  Claim(s) \_\_\_\_\_ is/are allowed.  
6)  Claim(s) 1-12 is/are rejected.  
7)  Claim(s) \_\_\_\_\_ is/are objected to.  
8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

9)  The specification is objected to by the Examiner.

10)  The drawing(s) filed on 15 June 2005 is/are: a)  accepted or b)  objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)  All    b)  Some \* c)  None of:

1.  Certified copies of the priority documents have been received.
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)  Notice of References Cited (PTO-892)  
2)  Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3)  Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 6/15/05.

4)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_ .  
5)  Notice of Informal Patent Application  
6)  Other: \_\_\_\_ .

**DETAILED ACTION**

***Status of the Application***

1. **Claims 1-12** are pending in this application.

***US National Phase of PCT***

2. Acknowledgment is made that this application is the US national phase of international application PCT/IB03/05740 filed 5 December 2003 which designated the U.S. and claims benefit of EP03103340.0, filed 10 September 2003, EP03100583.8 filed, 7 March 20003, and EP02080430.8, filed 19 December 2002.

***Foreign Priority***

3. Acknowledgment is made that the certified copy of the foreign priority document has been received in the national stage application from the International Bureau.

***Information Disclosure Statement***

4. Acknowledgment is made that the information disclosure statement has been received and considered by the examiner. If the applicant is aware of any prior art or any other co-pending applications not already of record, he/she is reminded of his/her duty under 37 CFR 1.56 to disclose the same.

***Drawings***

5. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, "the phase change material constituting a conductive path between a first contact area and a second contact area, a cross-

section of the conductive path being smaller than the first contact area and the second contact area" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

*Specification*

6. The disclosure is objected to because of the following informalities: Paragraph [0048] specification identifies the resistor by the reference character "6". Previously the resistor was identified by the reference character "7". Appropriate correction is required.
7. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the

following is required: **Claim 5** recites the limitation “...a cross-section of the conductive path being smaller than the first contact area and the second contact area.” However this limitation is not supported by the disclosure.

***Claim Rejections - 35 USC § 112***

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. **Claims 2-3 and 5-10** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

10. **Claim 2** recites the limitation “...wherein the heating element has a heating element electrical resistance”. It is unclear whether the “heating element electrical resistance” is different than the normal electrical resistance of the heating element. Hence one having ordinary skill in the art at would not be reasonably apprised of the scope of the invention and this claim is rendered indefinite.

11. **Claim 5** recites the limitation “...wherein the phase change material constitutes a conductive path between a first contact area and a second contact area, a cross-section of the conductive path being smaller than the first contact area and the second contact area.” It is unclear whether the conductive path is a volume or a line, and where the conductive path is located. This claim seems to indicate that the conductive path is different than the volume of the phase change material. The claim recites a cross section of the conductive path. It is not clear whether this cross section is a cross sectional area or something different. This claim is deficient

because it is imprecise. Hence one having ordinary skill in the art at would not be reasonably apprised of the scope of the invention and this claim is rendered indefinite.

12. **Claim 7** has the following language: "...a composition  $X_{100-(t+s)}Si_sY_t$ , where t and s denote atomic percentages satisfying  $t < 0.7$  and  $s+t > 0.3$ ." Using this terminology literally, and assuming  $s+t=0.31$  the composition would be  $X_{99.69}Si_sY_t$ . A different reasonable interpretation (in light of the specification) indicates that Applicant intended to denote the atomic percentages as  $t < 70\%$  and  $s+t > 30\%$ . This confusion in the terminology renders the claim indefinite.

*Claim Rejections - 35 USC § 102*

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

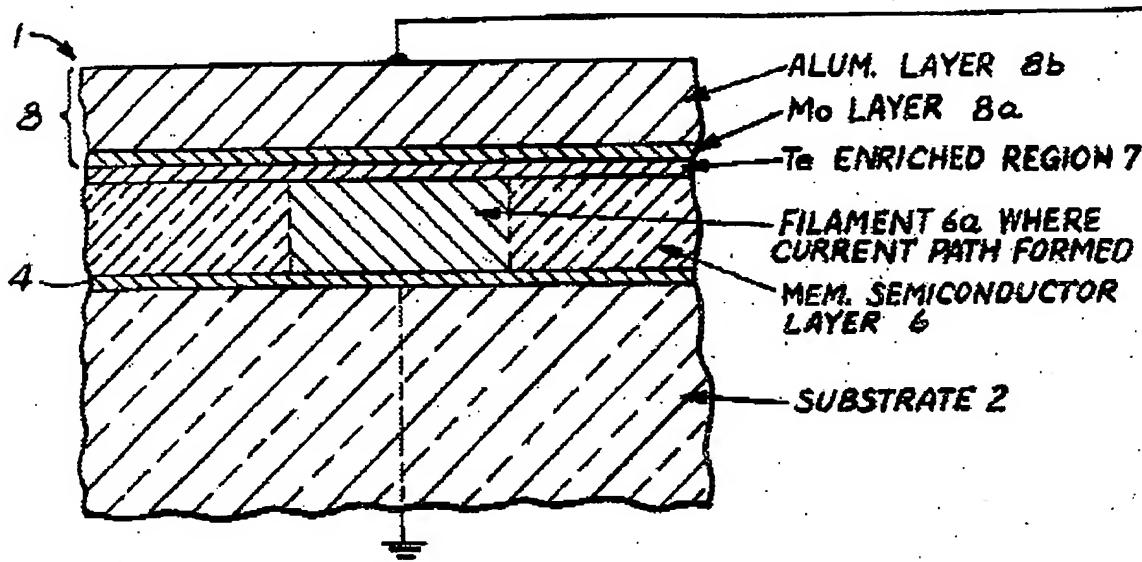
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. **Claims 1, 2 and 4** are rejected under 35 U.S.C. 102(b) as being anticipated by Cohen (US Patent No 3,846,767)

15. Per **Claim 1** Cohen (figure 1) discloses a device including a body having

- a resistor comprising a phase change material (6) being changeable between a first phase and a second phase, the resistor having a first electrical resistance when the phase change material is in the first phase and a second electrical resistance, different from the first electrical resistance, when the phase change material is in the second phase, (column 1 lines 56-60)

- a heating element (6a) being able to conduct a current for enabling a transition from the first phase to the second phase, the heating element being arranged in parallel with the resistor. (column 1 lines 64-67)



*Prior Art: Cohen Figure 1*

16. Additionally, claim 1 recites the performance properties of the phase change material. This functional limitation does not distinguish the claimed device over the prior art, since it appears that this limitation can be performed by the prior art structure of Cohen. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997) See MPEP 2114.

17. Per **Claim 2**, insofar as definite, the claim is interpreted for examination in view of the existing prior art as follows: Cohen discloses the device of claim 1, including where the heating element has a heating element electrical resistance which is smaller than the maximum of the

first electrical resistance and the second electrical resistance. (figure 1 teaches that the current path is formed in the heater (filament (6a)). Hence the reference inherently discloses that the resistance of the heating element is smaller than the maximum of the first electrical resistance and the second electrical resistance, otherwise the current path would be formed in the phase change material)

18. Per **Claim 4** Cohen (figure 1) discloses the device of claim 1 including where the heating element and the resistor are in direct contact.

*Claim Rejections - 35 USC § 103*

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

21. **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen (as above).

22. Per **Claim 3**, insofar as definite, the claim is interpreted for examination in view of the existing prior art as follows: Cohen (figure 1) discloses the device of claim 2 including a heating element

23. Cohen fails to disclose where the heating element's electrical resistance is larger than 0.3 times the minimum of the first electrical resistance and the second electrical resistance.

24. It would have been obvious as a matter of design choice to form the device so that the cross-section of the conductive path is smaller than the first and second contact areas since applicant has not disclosed that to do so solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the device of Cohen.

25. **Claims 7-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen in view of Ovshinsky et al. (US Patent No 6,087674).

26. Per **Claim 7**, insofar as definite, the claim is interpreted for examination in view of the existing prior art as follows: Cohen discloses the device of claim 1 including a heating element.

27. Cohen fails to teach where the heating element material is of a composition  $X_{100-(t+s)}Si_sY_t$ , where t and s denote atomic percentages satisfying  $t < 0.7$  and  $s+t > 0.3$ , X comprises one or more elements selected from Ti and Ta, and Y comprises one or more elements selected from C and N.

28. Nakamori teaches a heating element (heating resistors) where the composition satisfies  $X_{100-(t+s)}Si_sY_t$  (TaSiC, column 5 lines 21-35, TaSiN, column 6 lines 28-35) where t and s denote atomic percentages satisfying  $t < 0.7$  and  $s+t > 0.3$ , where X is Ta, and Y comprises one or more elements selected from C and N.

29. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a heating element with a composition of composition  $X_{100-(t+s)}Si_sY_t$ , where t and s denote atomic percentages satisfying  $t < 0.7$  and  $s+t > 0.3$ , X comprises one or more elements selected from Ti and Ta, and Y comprises one or more elements selected from C and N in order to provide a heating element which has good durability (Nakamori, column 2 lines 66-67) as taught by Nakamori for the device of Cohen.

30. Per **Claim 8**, insofar as definite, the claim is interpreted for examination in view of the existing prior art as follows: Cohen in view of Nakamori teaches the device of claim 7 including where X is substantially free from Ti. (TaSiC, column 5 lines 21-35, TaSiN, column 6 lines 28-35)

31. Per **Claim 9**, insofar as definite, the claim is interpreted for examination in view of the existing prior art as follows: Cohen in view of Nakamori teaches the device of claim 7 including where s is smaller than or equal to 0.7. (Nakamori column 4 lines 18-22 teaches that the metal Ti or Ta makes up 45-70 % weight of the resistor, hence the fact that the Si percentage (denoted by s ) is less than 70% is inherently disclosed by the reference.

32. Per **Claim 10**, insofar as definite, the claim is interpreted for examination in view of the existing prior art as follows: Cohen in view of Nakamori teaches the device of claim 7 including where Y comprises N. (Nakamori TaSiN, column 6 lines 28-35).

33. **Claims 11-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen in view of Lowrey et al. (US Patent No 6,314,014).

34. Per Claim 11, Cohen discloses the device of claim 1 including where the resistor constitutes a memory element but fails to teach where the body comprises: an array of memory cells, each memory cell comprising a respective memory element and a respective selection device, and a grid of selection lines, each memory cell being individually accessible via the respective selection lines connected to the respective selection device.

35. Lowrey teaches a phase change memory device (e.g. figure 2A) including an array of memory cells (110), each memory cell comprising a respective memory element (memory cell) and a respective selection device (reference cell), and a grid of selection lines (CL1-CL6 and RL1-RL4), each memory cell being individually accessible via the respective selection lines connected to the respective selection device (column 8 lines 20-67)

36. It would have been obvious to one having ordinary skill in the art at the time the invention was made to put the device of Cohen into an array such as that of Lowrey in order to reliably read the resistance states of the memory elements. (Lowrey column 5 lines 13-16)

37. Per claim 12, Cohen in view of Lowrey teaches the device of claim 11 including where

- the selection device comprises a metal oxide semiconductor field effect transistor (MOSFET) (Lowrey column 5 lines 52-57). MOSFET's are equipped with a source region, a drain region and a gate region, hence this is inherently disclosed by the reference.
- the grid of selection lines comprises N first selection lines (column lines), M second selection lines (row lines), and an output line (power line) (Lowrey column 9 lines 1-13)
- each memory element electrically connecting a first region selected from the source region and the drain region of the corresponding metal oxide semiconductor field effect transistor to the output line (Lowrey column 9 lines 6-8 and 10-13)

- a second region of the corresponding metal oxide semiconductor field effect transistor selected from the source region and the drain region and being free from contact with the first region, being electrically connected to one of the N first selection lines (column lines), (Lowrey column 9 lines 4-6)
- the gate region being electrically connected to one of the M second selection lines, (row lines). (Lowrey column 9 lines 8-10)

***Cited Prior Art***

38. The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Reference 1: US Patent Application Publication No 5,761,115 by Kozicki et al.

Reference 2: US Patent Application Publication No 2002/0017701 by Klersy et al.

Reference 3: US Patent Application Publication No 5,858,533 by Greuter et al.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jami M. Valentine, Ph.D. whose telephone number is (571) 272-9786. The examiner can normally be reached on Mon-Thurs 8:30am-7pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*mw*

Jami M Valentine, Ph.D.  
Examiner  
Art Unit 2815

4/6/2007

*JEROME JACKSON*  
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PRIMARY EXAMINER